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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/709,483	11/13/2000	Oh-Nam Kwon	8733.307.00	4557

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EXAMINER	
PHAM, THANH V	

ART UNIT	PAPER NUMBER
2823	

DATE MAILED: 02/04/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/709,483	KWON, OH-NAM	
	Examiner	Art Unit	
	Thanh V Pham	2823	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *22 November 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-13* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-13* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *22 November 2004* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. The amendment filed 11/22/2004 is objected to under 35 U.S.C. 132 because it introduces new matter into the disclosure. 35 U.S.C. 132 states that no amendment shall introduce new matter into the disclosure of the invention. The added material which is not supported by the original disclosure is as follows: FIG. 5A is amended without support in the specification as original filed. Applicant's statement in the third paragraph of the Remark is conclusive and does not point to support in the specification. The only passage mentioned to this figure, from page 10, line 22 to page 11, line 3, "[T]he seed metal 154 is deposited on the whole surface of the substrate 1. Thereafter, when the seed metal 154 on the photoresist 150 is removed, the seed metal 154 remains only on the groove 152", clearly describes the old fig. 5A not the new Fig. 5A.

Applicant is required to cancel the new matter in the reply to this Office Action.

Claim Rejections - 35 USC § 112

2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

3. Claims 1-13 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed,

had possession of the claimed invention. In this instance, "a side portion of the photoresist pattern being exposed between the substrate and the second metal" is new matter as discussed above.

4. Claims 1-2 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamazaki et al. US 5,247,191 in combination with Shigeta et al. US 6,480,253 B1 and Havemann et al. U.S. Patent No. 5,891,804.

The Yamazaki et al. reference discloses an improved method for filling trench in a single layer substrate to produce electrode for LCD devices. Embodiment 3 comprises preparing a substrate; forming a photoresist pattern P1 on the substrate; etching a portion of the substrate to form a groove 101 beneath a top surface of the substrate using the photoresist pattern P1 as a mask; depositing a metal 102 on the substrate, a height of the second metal being smaller than a depth of the groove; removing the photoresist pattern on the substrate and the second metal on the photoresist other than in the groove *by lift-off technique (col. 6, line 4)*, fig. 7(A).

The Yamazaki et al. reference does not teach how the lift-off technique is applied.

The Shigeta et al. reference teaches forming electrode for LCD device in trench 10, figs. 3 wherein the metal 3 is formed in trench 10 with a height of the metal being smaller than a depth of the trench, *a side portion of the photoresist pattern being exposed between the substrate and the metal*; and the photoresist pattern on the substrate and the second metal on the photoresist other than in the trench is removed *by lift-off process, col. 8, lines 19-42.*

It would have been obvious to one of ordinary skill in the art at the time of the invention to provide the lift-off technique of Yamazaki et al. with the lift-off process of Shigeta et al. since the process of Shigeta et al. would provide better detail illustration of the process steps for the technique of Yamazaki et al. with *a side portion of the photoresist pattern being exposed between the substrate and the metal.*

The Yamazaki et al./ Shigeta et al. combination does not disclose preparing a mixed solution having a reductant and a first metal for forming the first metal on the second metal in the groove by submerging the substrate in the mixed solution.

The Havemann et al. reference discloses a process for forming thin film conductors comprising forming a photoresist pattern 46 on a substrate 42/40; etching a portion of the substrate to form a groove 47 *beneath a top surface of the glass substrate* using the photoresist pattern as a mask; depositing a second metal 50 on the substrate, col. 2, lines 13-15, and a height of the second metal being smaller than a depth of the groove, fig. 3b; removing the photoresist pattern on the substrate and the second metal on the photoresist other than in the grove, fig. 3c; and forming the first metal 52 principally copper, col. 2, line 18, on the second metal in the groove, col. 4, lines 54-55, by electroless plating.

The step of electroless deposition inherently includes the step of preparing a mixed solution having a reductant and a first metal and submerging the substrate in the mixed solution.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the method steps of Havemann in the method of Yamazaki

et al./ Shigeta et al. combination as those formation steps would have been selected to improve further the filling trench in accordance with the thin film conductor as taught by Yamazaki et al./ Shigeta et al. combination.

5. Claims 4-5, 7-8 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over the above combination as applied to claims 1-2 and 11 above, and further in view of Senda et al. U.S. Patent No. 5,364,459.

Re claims 1-2 and 11, the combination discloses essentially all of the limitation, it does not disclose Ag and Au and the kind of reductant used.

Re claims 2, 4-5, 7-8, 10-11, the Senda et al. reference discloses in the background of the invention that the first metal could be Cu, Ag or Au; the reductant could be formaldehyde; and "the electroless plating is not only applied to formation of a conductive film such as an electrode for an electronic component", col. 1, lines 10-35.

It would have been obvious to one of ordinary skill in the art to apply the known materials as stated by Senda et al. to the method of the combination because such materials would have been chosen for electroless plating process in order to have better trench fill in the art of making electrode for an electronic device. The use of Cu, Ag or Au and formaldehyde is well known to those skilled in the art as taught by Senda et al.

6. Claims 3, 6 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Havemann et al., Yamazaki et al./ Shigeta et al. and Senda et al. combination as applied to claims 1-2, 4-5, 7-8 and 10-11 above, and further in view of Charneski et al. U.S. Patent No. 6,284,652 B1 and/or Eriksson U.S. Patent No. 3,632,435.

Both Havemann et al./ Yamazaki et al./ Shigeta et al. combination and Senda et al. do not disclose the mixed solution for the electroless plating.

The Charneski et al. reference discloses sulfuric acid and cupric sulfate (col. 8, line 31) used in cooper plating process.

The Eriksson reference discloses the use of silver nitrate, gold chloride with noble metal salts and hydroxide in the mixed solution for electroless plating (col. 5, lines 45-65).

It would have been obvious to one of ordinary skill in the art to apply the known materials as stated by Charneski et al. and/or Eriksson to the method of Havemann et al./ Yamazaki et al./ Shigeta et al. and Senda et al. combination because such materials would have been chosen for the electroless plating process in the art of making electrode for an electronic device in the process of the combination of Havemann et al./ Yamazaki et al./ Shigeta et al. and Senda et al. The use of sulfuric acid and cupric sulfate is well known to those skills in the art as taught by Charneski et al. and/or Eriksson.

7. Claims 12-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Havemann et al./ Yamazaki et al./ Shigeta et al. and Senda et al. combination as applied to claims 1-2, 4-5, 7-8, 10 and 11 above, and further in view of JP 05-265040 and applicant's admitted prior art.

The Havemann et al. reference discloses a process for forming thin film conductors comprising forming a photoresist pattern on a substrate using electroless

plating, the Senda et al. reference discloses formation of a conductive film such as an electrode for an electronic component using electroless plating.

None of the references disclose the further steps for forming the transistor.

However, JP 05-265040 (provided by applicant) discloses the steps of making gate line in a trench and the applicant admitted prior art that performing the further steps for forming the transistor.

It would have been obvious to one of ordinary skill in the art to apply the gate electrode of Senda et al. using the method of Havemann et al./ Yamazaki et al./ Shigeta et al. combination into of making a trench gate line and the applicant's admitted prior art of forming transistor as the method and the analogous electrode would be selected in accordance with JP 05-265040 and the applicant's admitted prior art.

Response to Arguments

8. Applicant's arguments with respect to claims 1-13 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

10. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP

§ 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thanh V. Pham whose telephone number is 571-272-1866. The examiner can normally be reached on M-Th (6:30-5:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on 571-272-1855. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

TvP
01/26/2005

George Fourson
Primary Examiner